1. Application

This specification applies to the structure and characteristics of SIP type Solid State Relay (SSR), Model No. S101S02.

2. Outline

2.1 Refer to the attached drawing No. CY1949E02.

2.2 (1) Trade mark (2) Model No. and (3) Lot symbol shall be indicated on the surface.

3. Ratings and characteristics

3.1 Absolute maximum ratings

	Parameter	Symbol	Rating	Unit	Conditions
Input	Forward current	I_F	50	mA	
Input	Reverse voltage	V_R	6	V	
Output	RMS on-state current	I_T	1.5	Arms	Refer to the Fig. 1
Output	Peak one cycle surge current	I_{surge}	30	A	60Hz sine wave *2
Output	Rapetitive peak off-state voltage	V_{DRM}	400	V	
Output	Non-repetitive peak off-state voltage	V_{DSM}	420	V	
Output	Critical rate of rise of on-state current	dI_T/dt	40	A/μs	
Operating temperature		T_{opr}	-25 ~ +100	°C	
Storage temperature		T_{stg}	-30 ~ +125	°C	
Isolation voltage *1		V_{iso}	4.0	kVrms	AC for 1min. 60Hz RH=40 ~ 60%
Soldering temperature		T_{sol}	260	°C	For 10 seconds

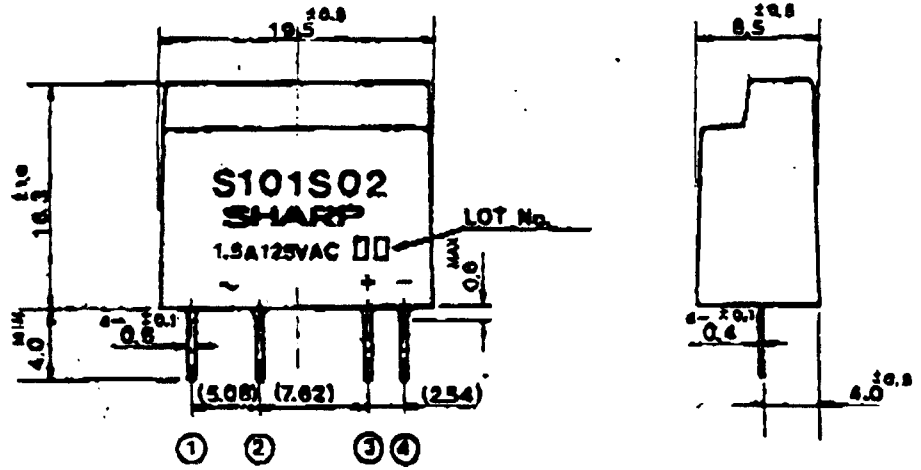
*1 Isolation voltage measuring method
(1) Dielectric withstand tester, with zero-cross circuit shall be used.
(2) The waveform of applied voltage shall be sign wave.
(3) It shall be applied between input and output
(Inputs and outputs shall be short-circuited respectively)

*2 Start at Tj=25°C

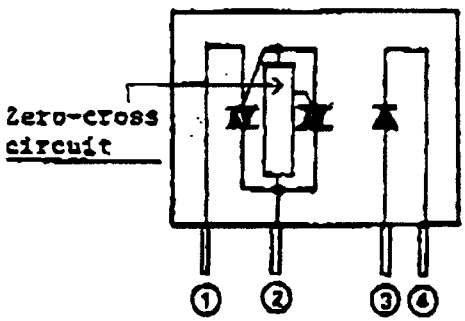
3.2 Electrical characteristics

Ta = 25°C

	Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Conditions
Input	Forward voltage	V_F	-	1.2	1.4	V	I_F = 20mA
	Reverse current	I_R	-	-	10^{-4}	A	V_R = 3V
Output	Repetitive peak off-state current	I_{DRM}	-	-	10^{-4}	A	$V_D = V_{DRM}$
	On-state voltage	V_T	-	-	1.5	Vrms	I_T = 1.5 Arms, R load
	Holding current	I_H	-	-	50	mA	
	Critical rate of rise of off-state voltage	dv/dt	30	-	-	V/μs	$V_D = 2/3V_{DRM}$
	Commutation critical rate of rise of off-state voltage	$(dv/dt)_c$	4	-	-	V/μs	T_j = 125°C, V_D = 400V dI_T/dt=-1.0 A/ms
Transfer characteristics	Zero-cross voltage	V_{OX}	-	-	35	V	I_F = 15mA
	Minimum trigger current	I_{FT}	-	-	15	mA	V_D = 6V, RL = 30Ω
	Isolation resistance	R_{iso}	10^{8}	-	-	Ω	DC500V RH = 40 ~ 60%
	Turn on time	t_{on}	-	-	10	ms	AC50Hz
	Turn off time	t_{off}	-	-	10	ms	AC50Hz
Thermal resistance		$R_{th(j-a)}$	-	60	-	°C/W	between junction-ambience



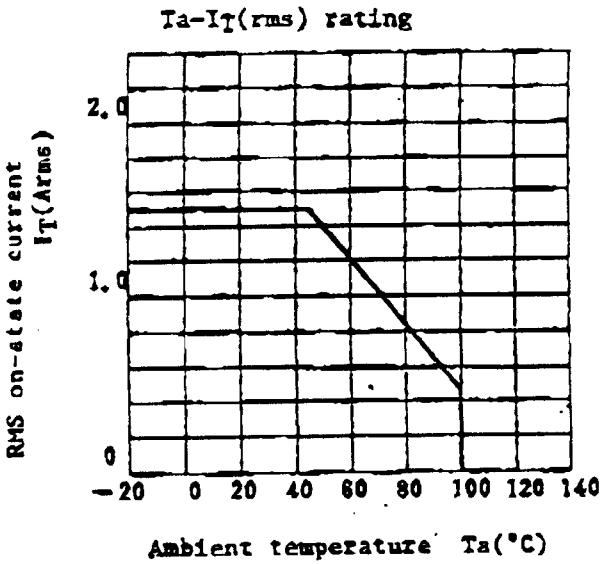
Internal Circuit



PIN No.	Connect
①	Output (Triac T1)
②	Output (Triac T2)
③	Input (+)
④	Input (−)

適用機種 APPLICABLE MODEL	S101S02	尺度 SCALE	単位 UNIT		
		2/1	1 − 1/1		
厚み THICKNESS	個数 PIECES	材質 MATERIAL	仕上 FINISH	名称 NAME	S101S02 Outline Dimension
		Epoxy resin			
作成 DATE	Feb. 4, 1987			コード CODE	
設計 DESIGN	製図 DRAW	承認 TRACE	検図 CHECK	本社 APPROVE	シャープ株式会社 電子部品事業本部

(Fig. 1) RMS on-state current vs. ambient temperature



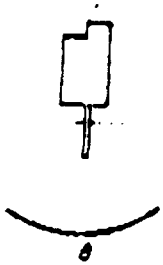
4.1 Reliability

The reliability of products shall be satisfied with items listed below.

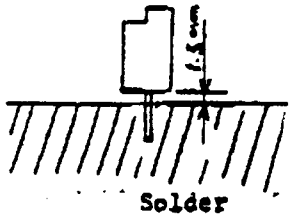
Parameter	Test Conditions	Judgement Criteria	Defective Samples
Temperature cycling	1 cycle −30°C → +125°C (30min.)(30min.) 20 cycle test	(1) Forward voltage: USL × 1.2 or less (2) Reverse current (3) Repetitive peak off-state current: USL × 2 or less (4) On-state voltage: USL × 1.2 or less (5) Repetitive peak off-state voltage: I±20% or less (6) Minimum trigger current: USL × 1.2 or less (7) Isolation resistance, Isolation voltage: Within the value of Spec.	0/10
Humidity storage	+60°C 90%RH 500H.		0/10
High temp. storage	+125°C 1000H.		0/10
Low temp. storage	−30°C 1000H.		0/10
Intermittent operation	AC 100V 1.5Arms 1 min. ON 1 min. OFF Ta = 25±3°C 500H.		0/10
Vibration	20G 100 ~ 2000Hz/4 min. 4 times/X, Y, Z direction		0/5
Terminal strength (Bending)	The first bending test is to put back into the original shape after the terminal bent 90° by a 500g load. The second bending test is to do the same but oposite direction. These two tests shall be performed. *1		0/5
Terminal strength (Tension)	Weight: 0.5kg 30 sec./terminal direction		0/5
Soldering heat	260±5°C 5 sec. Up to 1.5mm from resin portion *2		0/5
Solderability	230±5°C 5±0.5 sec. Use rogin flux.	Solder shall adhere at the area of 95% or more of dipped portion	0/5

USL : Max. specification values I : Initial values

*1 Terminal bending direction is shown below.



*2 Soldering area is shown below.



4.2 Incoming inspection standard

A single sampling plan, normal inspection level II based on MIL-STD-105D is applied.
The AQL according to the inspection items are shown below.

Defect	Inspection Items	AQL	Judgement Criteria
Major defect	• Electrical characteristics • Unreadable marking • Open, short	0.1	Depend on the specification
Minor defect	• Appearance • Dimensions	0.4	

5. Notes

(1) With an inductive load that may not turn on SSR. operate with overdrive by running a driver circuit 2.5~3 times minimum trigger current (I_{FT}). Note that the power factor should be more than 0.1.

(2) Please make sure that surge absorption circuit and dv/dt control circuit are provided for protection of element. In general, we recommend that both CR circuit and balister be used in conjunction. Watch for faulty operation that may be caused by leakage current that runs through the CR circuit.

(3) Current value of the load shall be holded within the range of derating curve.

(4) Some have a built-in rectifier such as diode, etc. as part of the electromagnetic counter or solenoid specified for use on AC. If this is the case, check out properly the waveform of the load current. If it is a rectangular wave as it may become, the SSR will not turn OFF.

SHARP

5. Notes

(1) With an inductive load that may not turn on SSR. operate with overdrive by running a driver circuit 2.5~3 times minimum trigger current (I_{FT}). Note that the power factor should be more than 0.1.

(2) Please make sure that surge absorption circuit and dv/dt control circuit are provided for protection of element. In general, we recommend that both CR circuit and balister be used in conjunction. Watch for faulty operation that may be caused by leakage current that runs through the CR circuit.

(3) Current value of the load shall be holded within the range of derating curve.

(4) Some have a built-in rectifier such as diode, etc. as part of the electromagnetic counter or solenoid specified for use on AC. If this is the case, check out properly the waveform of the load current. If it is a rectangular wave as it may become, the SSR will not turn OFF.